

WO 01/80193

PCT/AU01/00435

- 1 -

**COMMUNICATIONS DEVICE WITH CARD FACILITY****FIELD OF INVENTION**

5 The present invention relates generally to portable memory devices and in particular, but not exclusively, to portable memory devices generically known as smart cards.

The present invention also relates to electronic funds transfer systems and devices, in particular EFT systems and devices for use at point of sale ("POS") outlets.

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**BACKGROUND OF INVENTION**

Portable memory devices for facilitating personal banking, ticketing, transport, identification and other products, are well known. They include the ubiquitous magnetic stripe card and also "smart cards". Smart cards generally have more functionality than magnetic stripe cards, as they include circuitry enabling processing functions, as well as just memory. Smart cards are generally of two types:

20 (a) Smart cards with contacts - These include electrical contacts for mating with corresponding electrical contacts on a smart card reader enabling data communications between the smart card and the device having the smart card reader.

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(b) Contactless smart cards - These communicate with smart card readers by wireless communications, usually short length radio communications. They usually do not carry their own power source, but power for the processing and communications is provided via the short length radio signal.

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Smart cards are capable of supporting more than one "product", e.g. a purse card product, transport card product, security card product, bank card product (credit or debit card product). Nevertheless, in order to be able to use a smart card product, it is conventional to carry a

35

WO 01/80193

PCT/AU01/00435

- 2 -

separate smart card e.g. carried in the user's wallet. Often, although multi-function smart cards are available, separate products are provided on a separate smart card, so it is usually necessary to carry many smart cards in order to implement many products. Further, smart cards are easily lost, stolen or misplaced, particularly where they need to be carried separately from other devices.

Portable communications devices, such as mobile telephones are also well known. Many mobile telephones themselves include smart cards in the form of a SIM. These are provided for the specific purpose of facilitating personal communications and provide security (without a configured SIM a mobile phone usually cannot be used) and encryption of communications. A SIM is usually provided in the form of a small card which is inserted in a slot within the mobile telephone. The only function of a SIM is related to the mobile telephone communications function.

One major application of devices such as smart cards is in electronic funds transfer. For example, electronic funds transfer at point of sale in supermarkets, from vending machines and at other retail outlets. In order to enable an electronic funds transfer (EFT), an EFT device is required at POS which the smart card (or magnetic stripe card) interacts with to provide information about the account owner the card to the EFT device. The EFT device then subsequently communicates with transaction acquirer, such as a bank, so the transaction (usually payment of funds to the retailer) can take place so that the card owner can purchase the products (goods or services) available at the point of sale. Supply and maintenance of EFT devices (which are usually owned by a transaction acquirer, such as a bank) is relatively expensive. The requirements for an EFT device also means that a purchaser must attend the EFT device in order to purchase a product, and this can at times, be inconvenient particularly for example, where there are long queues.

WO 01/80193

PCT/AU01/00435

- 3 -

SUMMARY OF INVENTION

The present invention provides a mobile communications device including card implementation means arranged to  
5 implement a card product which is unrelated to the normal operation of the mobile communications device.

By "normal operation" is meant the operation of the mobile communications device which relates to its communication function. For example, a SIM card includes  
10 security information which enables a mobile phone to communicate with an open network. This would be part of the "normal operation" of the phone.

By "card product" is meant any type of product which is usually associated with "cards" (cards being portable  
15 memory devices such as smart cards and magnetic stripe cards), and includes transport, ticketing, identification, loyalty points and financial transaction cards (purse cards, bankcards, credit cards, debit cards etc).

The means arranged to implement a card product may be  
20 circuitry within the phone (for example, a processor and a memory), or may be a portable memory device such as a smart card (a smart card is a card which includes some processing power as well as memory). The mobile communications device is preferably a mobile telephone.

25 The card implementation means may operate in a similar way to a contactless smart card, so data can be sent to/from the card implementation means via wireless communications (usually radio, usually relatively short range). Alternatively, a communications interface may be  
30 provided to enable communication with the card implementation means. The interface may be a wireless interface, such as an infrared port (already available in many mobile telephones). Alternatively, the portable communications device may be provided with contacts  
35 connectable to the card implementation means, the contacts being able to interface with corresponding contacts in a card reader. Card readers are well known and arranged to

WO 01/80193

PCT/AU01/00435

- 4 -

interface with portable memory devices such as smart cards. Preferably, the contacts connectable to the card implementation means are arranged to interface with card reader contacts.

- 5            Preferably, the card implementation means is provided as a portable memory device, preferably a smart card, arranged to be mounted to the portable communications device.

10           In one embodiment, the portable memory device is a smart card which operates as a SIM card as well as being arranged to implement another card product or products. This card may be mounted in the standard slot available in the mobile telephone for receiving the SIM card. In another embodiment, separate mounting means (e.g. a  
15 further slot) are provided for mounting a smart card separate from the SIM card used in the mobile phone, and the separately mounted smart card is arranged to implement the card product(s) unrelated to the normal operation of the mobile telephone.

- 20           Preferably, means are provided to enable the portable memory device to make use of the relatively long range communications facility (preferably an open network communications facility) provided by the mobile communications device. For example, if the mobile  
25 communications device is a mobile phone and the card product of the portable memory device is a purse card (where credit is loaded onto and removed from the card), use can be made of the mobile communications facility to communicate with a bank account to load further cash to  
30 the purse card or obtain account information.

As discussed above, one of the major applications of card related products is in facilitating electronic funds transfers, for example, at retail locations. One major application of the present invention is that the  
35 relatively long range communications facility of the mobile device may be used to communicate with a bank account to facilitate EFT at POS. In this case,

WO 01/80193

PCT/AU01/00435

- 5 -

therefore, the mobile communications device with the portable memory device can effectively act as a "personal" EFT device. The use of the mobile communications device can thus carry out their own EFT transactions. In one example, a user could purchase product from a suitably arranged vending device using a personal EFT facility. With local communications (infrared or local wireless such as BLUETOOTH™) the portable memory device communicates with the vending machine and advises that it wants to purchase a particular product. The vending machine advises the amount of the purchase and may give a code number identifying the transaction to the mobile communications device. The mobile communications device subsequently communicates with a transaction acquirer (e.g. bank) and facilitates an EFT transaction from the user's account to the vending machine owner's account. Acknowledgment is received by the vending machine via the mobile communications device (perhaps with an identification token confirming that the transaction has taken place) and the product is delivered.

Preferably, application of the mobile communications device with portable memory as a personal EFT device can be extended to any application where EFT is required, e.g. any POS application.

The present invention has the advantage that a mobile communications device can include a card implementation means which includes card products required by a user, so that the user need not carry separate cards. All card products the user requires may be included within the portable memory device, so that the user need only carry a single device to implement all products required. The invention further has the advantage that the display of the mobile communications device (available on mobile phones) can enable the user to view information stored in the card implementation means or view transaction information regarding a transaction involving the card implementation means, e.g. the user could view an account

WO 01/80193

PCT/AU01/00435

- 6 -

balance in the card implementation means.

The mobile communications device preferably comprises a key pad and the key pad can preferably be used to interface with the card implementation means to instruct  
5 commands, for example.

The present invention further provides a method of implementing a card product comprising the steps of providing a mobile communications device including a card implementation means.

10 Preferably, the card implementation means is a portable memory device mounted within the mobile communications device. Preferably the mobile communications device is a mobile phone and the portable memory device is a smart card.

15 The present invention yet further provides a card reader adapted to communicate with a card implementation means included within a mobile communications device.

A standard smart card reader, for example, may be adapted to receive communications from an infrared port of  
20 a mobile phone in order to communicate with a smart card mounted within the mobile phone. Many devices that presently have smart card readers or magnetic card readers can easily be adapted to utilise infrared communications. For example, smart card readers of vending devices can be  
25 adapted to communicate with smart cards using infrared.

In one embodiment, an adaptor may be provided to adapt smart card readers to communicate with a card implementation means via infrared communications. The adaptor may be carried with the mobile communications  
30 device.

The present invention further provides a portable memory device arranged to implement a card product unrelated to operation of a mobile communications device, and arranged to be mounted within the mobile  
35 communications device.

Preferably, the mobile communications device is a mobile telephone, and the portable memory device is a

WO 01/80193

PCT/AU01/00435

- 7 -

smart card.

In accordance with the further aspect of the present invention, there is provided a mobile communications device including means for communicating with a POS device and means for facilitating an EFT transaction between the mobile communications device and the POS device.

The mobile communications device is preferably a personal communications device, such as a mobile telephone. The means for facilitating EFT preferably includes a means for identifying a user account, being an account of the owner of the mobile communications device, and also appropriate security means required by a transaction acquirer to enable the EFT.

The mobile communications device preferably includes a relatively long range communications facility so that it can communicate with a remote transaction enquirer destination, e.g. a bank, in order to enable the EFT.

The means for communicating with the POS device preferably includes a local communications facility, such as infrared or local wireless communications. It may also, or alternatively, include a port which enables connection to a reader for direct communications with the POS device rather than wireless communications.

The device of this aspect of the invention may include any or all of the features of the mobile communications device discussed above. In particular, the device may be implemented as a mobile communications device with a card product, in this case being a credit card or a debit card product, via which EFT can be facilitated, utilising the open network communications facility of the mobile device and the local communications facility for communicating with the POS device.

In accordance with the further aspect of the present invention, there is provided a POS device including means for communicating with a mobile device with an EFT facility, in order to facilitate an EFT transaction via the mobile communications device as discussed above.

WO 01/80193

PCT/AU01/00435

- 8 -

Features and advantages of the present invention will become apparent from the following description of embodiments thereof, by way of example only, with reference to the accompanying drawings, in which:

5        Figure 1 is a front view of a mobile communications device in accordance with an embodiment of the present invention;

10       Figure 2 is a view from the back of the mobile communications device of Figure 1, with the battery of the mobile communications device removed;

      Figure 3 is a schematic block circuit diagram of the mobile communications device of Figure 1;

15       Figure 4 is a view from the back with the battery removed of a mobile communications device in accordance with a further embodiment of the present invention;

      Figure 5 is a schematic diagram of automated teller machine adapted to operate with a device in accordance with embodiment of the present invention;

20       Figure 6 is a schematic diagram showing application of a device in accordance with embodiment of the present invention in interaction with POS device such as a vending machine;

25       Figure 7 is a schematic diagram illustrating a further POS application of a device in accordance with an embodiment of the present invention; and

      Figure 8 is a schematic diagram illustrating yet a further POS application of a device in accordance with an embodiment of the present invention.

30       Referring to Figures 1 and 2, a mobile communications device in accordance with an embodiment of the present invention, generally designated by reference numeral 1, includes a card implementation means, in this example being a portable memory device 2, mounted within a slot 3 within the mobile communications device 1, in a similar  
35       manner to a SIM card.

      In this example, the mobile communications device 1 is a mobile telephone including a keypad interface 4, a

WO 01/80193

PCT/AU01/00435

- 9 -

visual display 5 and a housing 6. The housing mounts circuitry which will be described in more detail later on with reference to Figure 3.

The mobile telephone 1 is arranged to carry out mobile  
5 telephone communications operations (voice to voice, data, etc) utilising a relatively long range open communications network (as is well known). The portable memory device 2 is arranged to implement a card product which is unrelated to normal operation of the mobile telephone. This can be  
10 any type of card product, and more than one card product may be implemented.

In this embodiment, the portable memory device is a smart card 2 which also operates as a SIM card.

The mobile telephone 1 also includes an infrared  
15 communications port 7, for communicating data as per conventional mobile telephone operation, a battery recharging port 8 and a port 9 for other devices such as headsets.

In addition, in this embodiment, a contact array 10 is  
20 provided for enabling data exchange with the smart card 2. A smart card reader (not shown) requiring data communications with the smart card 2 includes a corresponding contact array, as will be appreciated by a skilled person.

25 Conductive tracks 11 are provided to connect the contact array 10 and smart card 2.

In addition, in this embodiment, the smart card 2 may be connected to enable data transfer via the infrared port 7.

30 An alternative embodiment (not shown) of the smart card 2 may be a contactless smart card, in which case contact array 10 and interface with infrared port 7 are not required, as the smart card reader will communicate via short length radio. The short length radio is  
35 preferably directional, i.e. transmission and reception occur directionally.

Whichever interface is used, whether it be contact

WO 01/80193

PCT/AU01/00435

- 10 -

array 10, infrared port 7 or directional short length radio, the preferred type interface is a "close coupled" interface, i.e. not long range. The smart card can therefore communicate with selected other devices (via  
5 smart card readers). Preferably the short length radio range is in the order of one meter and is preferably directional. The antennae 16 of the mobile device could be used as the antennae for the short length radio transmission. Alternatively, and preferably, an antennae  
10 (not shown) may be included with the smart card 2, as is conventional.

Circuitry is shown schematically in Figure 3. The mobile communications device includes a mobile telephone processor 12, transmitter and receiver 13; communications  
15 circuitry 14; interface circuitry 15 for interfacing with the keypad and display, and an antenna 16 for radio communications. The smart card 2 includes a card processor 17. Buses (which include conductive tracks 11 as shown in Figure 2) connect each of the items of the  
20 circuitry in Figure 3. Further, the buses connect the contactor 8, 10 and infrared port 7 (which includes infrared port driver 18).

The buses connect the card processor 17 to other facilities of the communications device 1. For example,  
25 the long range communication facility of the mobile device can be employed to communicate with a bank to access the card processor 17 to authorise transfer of funds using security information on the card processor (where the card processor implements a financial product). Further, this  
30 also enables the smart card 2 to operate as a SIM card.

The card processor 17 may interface with the processor 12 of the mobile phone 6 to enable display of information on the display 5 to provide information as to card data and transactions. For example, the balance of a card  
35 account may be viewed via the display. Payments may be authorised by actuating the buttons 4. It is possible, for example, that the mobile phone 6 could be used to

WO 01/80193

PCT/AU01/00435

- 11 -

communicate with other machines, such as an ATM device, vending machine, ticketing machine, to communicate between the smart card and the machine, and information on the stages of a transaction may appear on the display 5 and operation of the process may be controlled by key pad interface (PINs and other control information may be input, for example).

For example, in one application, the key pad 4 may be used in conjunction with the smart card 2 to instruct an ATM to provide a certain amount of cash by debiting an account associated with the card 2. Information relating to the transaction process would be visible via the display 5. This could lead to development of ATMs which do not require any display or key pad interface, but are only accessible via a mobile communications devices enabled with card implementation means, in accordance with the present invention.

Figure 5 shows an automatic teller machine 20 which includes a housing 21 for storing cash (not shown), a display 22, a slot for receiving an ATM card 23, a cash slot 25 for dispensing cash and an infrared port 26 for communication with a device in accordance with the present invention. The ATM is essentially a standard ATM apart from the provision of the infrared port and any operating software arranged to enable it to communicate with the device 1. The device 1 in accordance with an embodiment of the present invention essentially operates as a proxy keyboard for the ATM. Information being transmitted between the device and infrared port 26 to enable the transaction so that cash can be delivered via the slot 25 to the user of the device 1.

A further embodiment of the present invention will now be described with reference to Figure 4. Note that the same reference numerals have been used in Figure 4 to designate equivalent features to the embodiment of Figures 1 and 2. Additional description of these features will not be given.

In the embodiment of Figure 4, a further smart card

WO 01/80193

PCT/AU01/00435

- 12 -

receiving slot 20 is provided for receiving a SIM card 21. The SIM provides all the normal features of a SIM card. The smart card 2 is therefore separate from the SIM card 21 in this embodiment. Different smart cards with  
5 different card products can be inserted in the slot 3 of the embodiment of Figure 4, without interfering with the operation of the mobile communications device, therefore.

Yet a further embodiment of the present invention will now be described with reference to Figures 6, 7 and 8. As  
10 discussed above, a mobile communications device with card product facility as described above in relation to figures 1 through 4 may also be utilised as a "personal" electronic funds transfer device ("EFT device"). The long range communications facility of the mobile device 1 is  
15 utilised to communicate with a transaction acquirer system to facilitate transfers between accounts. The local communications facility (e.g. infrared, wireless or hard wired communications port) is utilised to communicate with a point of sales device ("POS device") in order to obtain  
20 information on product and price so that the EFT transaction can be facilitated.

An example embodiment of this novel application will now be described with reference to Figure 6.

Figure 6 is a schematic diagram showing a vending  
25 machine 30. The vending machine 30 includes a housing 31 storing products (not shown). It will be appreciated that any product may be stored in the vending machine 30 e.g. cigarettes, canned drinks, or any other product. The vending machine includes a user interface, comprising a  
30 keyboard 32 and display 33. It also includes a card reader 34 for reading a conventional card (e.g. magnetic stipe card, smart card, etc). A user may use the interface 32, 33 and card reader 34 to purchase products

WO 01/80193

PCT/AU01/00435

- 13 -

in the conventional manner. Via the keyboard 32 and display 33 the user can inform the machine 30 of the product that they desire and can pay by way of the card reader 34. The machine has an EFT connection to enable  
5 the transaction (the EFT connection is not shown). A delivery chute (not shown) connects with a slot 35 for delivery of product.

In accordance with an embodiment of the present invention, use of the conventional card reader 34 is not  
10 required. The vending machine is also provided with a local communications facility in the form of an infrared port 35. The infrared port 35 may be connected to the card reader 34, and therefore may function as a standard card reader with an infrared port. This enables local  
15 communication with a device 1 in accordance with an embodiment of the present invention. Device 1 includes a portable memory which implements a credit or debit card facility, for example. Rather than the EFT transaction taking place via the machine's 30 connection with EFT, an  
20 EFT transaction may take place via the device 1.

Operation is as follows:

1. User of the device 1 approaches the machine 30 and selects which product they wish to purchase. This may be done either with the  
25 keyboard 32 and display 33 or, alternatively, via the keyboard 4 and display 5 of the device 1 and infrared interface 35. If via the display 4 and 5 of the device 1 and infrared port 35, the vending machine 30 must be  
30 suitably adapted to enable operation via the infrared port. This is something that would be within the realm of the scope of the art, as all that is required from the infrared port to

WO 01/80193

PCT/AU01/00435

- 14 -

the vending device 30 is similar signals that it would normally require from the interface 32 and 33 for selecting and purchasing product.

2. Having selected the product, the user of device 1 now indicates they wish to pay for the product using EFT via their device 1.

3. Data is transmitted from the infrared port 35 to the device 1 informing the device 1 of the product and purchase price (this may be by way of a product code which includes the product purchase price or product code plus purchase price). Information may also include the communications address of a transaction acquirer (e.g. a bank who is to deal with the transaction).

4. Device 1 prepares a message for communication to the transaction acquirer and communicates using its long range communication facility. The message includes the information from the vending machine 30, regarding the product transaction, and also information from the card product within the device 1, which would be the usual information required for any EFT transaction (e.g. account name of the user, any security information that is required for the EFT, etc.).

5. The transaction acquirer system implements transaction by transferring money from the user's account to the account of the owner of the vending machine 30.

6. The transaction acquirer system transmits a message back to the user device 1 which includes a token acknowledging the transaction

WO 01/80193

PCT/AU01/00435

- 15 -

has occurred.

7. This token is then transmitted via the infrared port to the vending device 30.

8. Once the vending device 30 receives the token  
5 acknowledging that the transaction has taken place, it delivers the product via the chute 35.

As will be appreciated, the use of the device such as this as a personal EFT device has many advantages, both  
10 for the user and for the owner of the POS device. In the example of Figure 6, for example, the interface 32, 33 may not be necessary nor the standard card reader 34.

Further, the vending device 30 will not require any EFT connection itself if all transactions can take place via  
15 personal EFT device such as a device 1. This would dispense with the need for a lot of expensive hardware, software and maintenance costs for EFT connections. Instead, all EFT transactions would go via user's personal devices.

20 There are also significant advantages for the user. For example, they may be required to input an amount of money to pay the POS device via the keypad 4. Because they are doing it via their own secure keypad, security risks are further limited.

25 Please note that the steps in the transaction discussed above are only one example of the steps that could be applied using a personal EFT device such as disclosed, and the present invention is not limited to those steps. Any way that EFT may be implemented via such  
30 a personal EFT device 1 is within the ambit of the present invention.

A further example of a POS application of a personal EFT device in accordance with an embodiment of the present

WO 01/80193

PCT/AU01/00435

- 16 -

invention will now be described with reference to Figure 7.

Many items for retail in stores, particularly expensive items, are provided with security tags which prevent the item from being removed from the store until the security tag is removed or disabled (otherwise an alarm is usually given off). In accordance with an embodiment of the present invention, such a tag can be arranged or adapted to facilitate an EFT transfer via a personal EFT device in accordance with an embodiment of the present invention.

Referring to Figure 7, reference numeral 40 designates an article of clothing which may be for purchase in a retail store. The article 40 has a security tag 41 affixed thereto. As well as including the usual arrangement which enables the security application, the tag 41 also includes means for providing information to a personal EFT device 1 in accordance with an embodiment of the present invention, to enable the device 1 to carry out an EFT transaction to purchase the article 40. Figure 7(a) discloses an arrangement internal to the tag 41 which includes a transceiver 42 and antenna 43 for enabling communications with the device 1. The tag 41 also includes a memory 43 for storing information on the article 40 which enables the EFT transaction to take place. The information may include a product code and price and also an identification of a transaction acquirer who is to acquire the EFT transaction and any other security information that may be required. The transceiver 42 may be of the type which is powered by an external power source and in this case it may be powered by radio signal from the device 1. In the embodiment shown, the device 1 includes a card implementation in the

WO 01/80193

PCT/AU01/00435

- 17 -

form of a contactless card which uses the power supply from the communications device in order to transmit and receive to the tag 1. Power from the signal from the device 1 may also power the transceiver 42.

- 5 Alternatively, the tag 41 may have its own power supply for powering transceiver 42.

Operation to implement an EFT transaction is as follows:

- 10 1. The user of the device 1 decides they wish to purchase the article 40. They initiate communications with the tag 41 via the device 1 utilising keypad 4 and display 5. The user indicates that they wish to purchase the garment 40.
- 15 2. Transceiver 42 and 43 of tag 41 transmit information from the memory 43 to the device 1. This information includes EFT information which may include a product code and price and identification of a transaction acquirer system.
- 20 3. Using the long range communications facility of device 1, the device 1 communicates with the transaction acquirer, sending them the appropriate information to enable the EFT transfer, including information identifying the user's account, and any security information that may be required.
- 25 4. The transaction acquirer implements transfer of funds from the user's account to the owner of the article's account.
- 30 5. The transaction acquirer transmits to the device information acknowledging that the transaction has taken place, which may include

WO 01/80193

PCT/AU01/00435

- 18 -

a token.

6. This token is transmitted to the tag 41.

7. The tag 41 when it receives the token that acknowledges the transaction has taken place, either disables itself or automatically opens and releases itself from the article 40. The user 1 can then take the article away with them.

If the tag 41 is to be re-used, the user may be required to drop the disabled or released tag within a return bin so that the retailer can re-use the tag.

Alternatively, if the tag 41 is relatively inexpensive the security application may merely be disabled and the user can take the tag out of the retail store with them.

A system such as this has many advantages. It will be appreciated, firstly, that a user no longer has to queue up at checkouts. They can obtain the goods they wish to purchase and merely leave the store having carried out the transaction easily, simply and quickly themselves. For the store owner, it means that there is less pressure on retail staff. They do not have to undertake all the transactions as many will be undertaken utilising personal EFT devices. In the limit, it may be possible to dispense with the need for a checkout, if all transactions are taking place via personal EFT devices.

A further POS application for a personal EFT device in accordance with the present invention will now be described with reference to Figure 8.

Figure 8 schematically illustrates products which may be for sale in a supermarket, for example. The products, generally designated by reference numeral 50 include a label 51 which can be read by a person (being the usual type of label on produce) and also a further label 52.

WO 01/80193

PCT/AU01/00435

- 19 -

The further label 52 may include a transceiver such as described above in relation to Figure 7(a) together with a memory which stores information enabling an EFT transaction. Such transceivers are available.

5. The user can purchase the produce 50 via a personal EFT transaction utilising the device 1. The process is similar to that discussed above. The difference here is that the device 1 may include a memory which stores a list of products 50 to be purchased before implementing a single EFT transaction for all products. This saves implementing many individual transactions for the products. Such a system could be applied for small goods, such as stored in a supermarket.

As an alternative to providing the label transceiver 52 (which depend on cost of these transceivers) it is possible the device 1 be provided with a barcode reader for reading all information from barcodes on the products for obtaining the EFT transaction information.

One of the advantages of using a mobile telephone as a personal EFT device is that the mobile telephone already includes personal security information in the form of a SIM card, which can be utilised to ensure that the EFT transactions remain secure. Alternatively, the user card information can be utilised to ensure that this transaction remains secure.

In the above embodiment the card implementation means is a smart card. The card implementation means need not be in the physical form of a "card", but could merely be in the form of circuitry arranged to perform the card product function, mounted within the mobile communications device.

Further the card implementation means may be implemented all or partly by software and the appropriate

WO 01/80193

PCT/AU01/00435

- 20 -

programming of the mobile communications device. A further aspect of the present invention relates to operating systems software for facilitating implementation of a mobile communications device with card implementation  
5 means as discussed above.

In the above embodiment, the mobile communications device is a mobile telephone. It will be appreciated that it could be any other type of mobile communications device, including a personal digital assistant (such as a  
10 palm top computer) including a communications facility, such as WAP enabled.

An alternative way of thinking of the device is as a "card" (by which we mean any means which implements a card type product) which has a long range communications  
15 facility, such as an open network communications facility. The card also has a local communications facility, such as wireless, infrared or even hard-contact communications facility.

It will be appreciated by persons skilled in the art  
20 that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative  
25 and not restrictive.